ZOOLOGIA 37: e51168
ISSN 1984-4689 (online)
zoologia.pensoft.net

RESEARCH ARTICLE

Key to the *Macrophya sibirica* group (Hymenoptera: Tenthredinidae) with description of a new species from China

Mengmeng Liu[1], Zejian Li[2], Meicai Wei[3]

[1]*College of Ecology, Lishui University. Lishui, Zhejiang, 323000, China.*
[2]*Postdoctoral Work Station, Scientific Research and Management Center of East China Pharmaceutical Botanical Garden, Lishui Ecological Forestry Development Center. Lishui, Zhejiang, 323000, China.*
[3]*College of Life Science, Jiangxi Normal University. Nanchang, Jiangxi, 330022, China.*
Corresponding authors: Zejian Li (lizejian2006@163.com), Meicai Wei (weimc@126.com)

http://zoobank.org/A1795540-4502-4032-BDF7-EA4D32B82712

ABSTRACT. The *Macrophya sibirica* group was proposed by Li et al. (2016). A new species in this group, *Macrophya nigrotrochanterata* **sp. nov.** from Liaoning Province, China, is here described and illustrated. A key to all Chinese species and a distribution map of the *M. sibirica* group in China are provided.

KEY WORDS. Sawflies, taxonomy, Tenthredinoidea

INTRODUCTION

Macrophya Dahlbom, 1835 is the third largest genus in Tenthredininae (Hymenoptera: Tenthredinidae). It contains 313 species worldwide, of which 174 extant species have been recorded from China up to April 2020 (Li et al. 2019a, 2019b, Liu et al. 2019a, 2019b, 2019c, 2020a, 2020b).

The taxonomy and distribution of *Macrophya* in China has been studied by Liu and his co-workers since 1994 and an infrageneric classification of *Macrophya* into species groups was given by Li et al. (2016, 2018, 2019b). The *Macrophya sibirica* group, originally proposed by Li et al. (2016), is a large species group within *Macrophya*, with twenty-two extant species worldwide, fifteen of which are recorded from China. They are all similar in general morphology by having the body length usually 9–12 mm in female and 8–8.5 mm in male, posterior corner of metepimeron without appendage, anal cell of forewing usually with a short, erect cross-vein. Based on these characteristics, they constitute a clearly defined species group within *Macrophya*. In this study, a new species belonging to this group is described and illustrated from Liaoning, China. According to the available data, species in this group are mainly distributed in northern China. A key to all sixteen Chinese species is provided.

MATERIAL AND METHODS

Eleven specimens of the newly described species were obtained by sweeping in forest fringe zones in Liaoning Province from China (Northeast China) in June 2016. In addition, 1,039 specimens of known species were examined and studied for this work. These specimens were examined with a Motic-SMZ-171 stereomicroscope. Images of the adults were taken with a Nikon D700 digital camera and a Leica Z16APO. The genitalia were examined with a Motic BA410E microscope and photographed with a Motic Moticam Pro 285A. Images were focus-stacked using Helicon Focus (HeliconSoft, Kharkiv, Ukraine) and further processed with Adobe Photoshop CS 11.0.

The terminology of genitalia follows Ross (1945) and that of general morphology follows Viitasaari (2002). For a few terms (e.g., middle fovea and lateral fovea), we follow Takeuchi (1952).

The holotype and all paratypes of the new species are deposited in the Scientific Research and Management Center of East China Pharmaceutical Botanical Garden, Lishui, Zhejiang, China (formerly Lishui Academy of Forestry, LSAF). Most specimens of known species are deposited in the Insect Collection of Central South University of Forestry and Technology, Changsha, Hunan, China (CSCS), and other specimens are deposited in LSAF.

Abbreviations: (OOCL) the distance between a lateral ocellus and the occipital carina, or the hind margin of the head where this carina would be if it was developed (Benson 1954). (OOL) the shortest distance between an eye and a lateral ocellus. (POL) the distance between the mesal margins of the two lateral ocelli.

TAXONOMY

Macrophya Dahlbom, 1835

Type species: *Macrophya montana* (Scopoli, 1763)

Macrophya sibirica species group

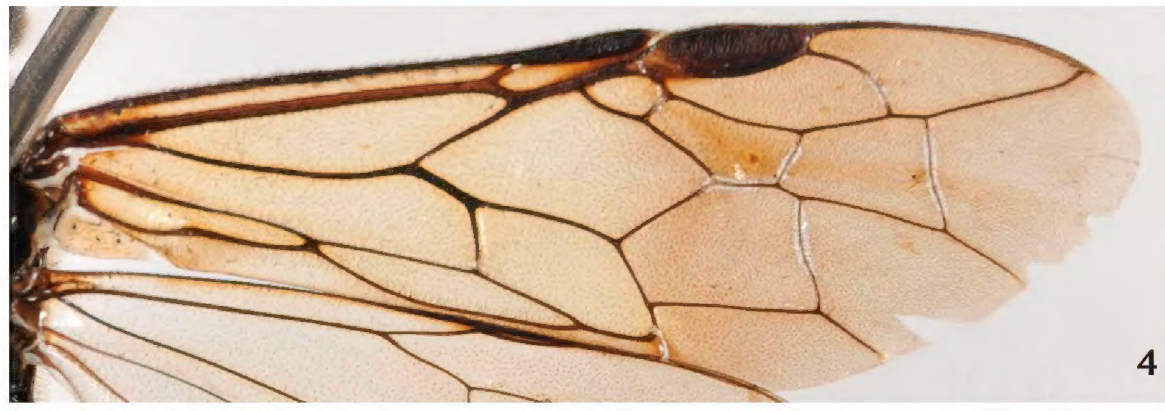
Diagnosis. Species of the *Macrophya sibirica* group can be recognized using the diagnosis provided by Li et al. (2016), and in particular by the following combination of morphological characters: body mainly black, partly white, without metallic tinge; antenna entirely black; apical margin of labrum usually white; clypeus usually largely or entirely black; anterior margin of clypeus incised (usually not deeply), lateral lobe short; posterior corner of metepimeron sub-quadrate, without appendage; abdominal tergum 1 usually with white maculae, but sometimes completely black in a few species; anal cell of forewing usually with a short, erect cross-vein, or in some species with a middle petiole, shorter than vein cu-a; ergot of penis valve distinct.

The *M. sibirica* group comprises a large portion of the *Macrophya* species and is morphologically similar to the *M. malaisei* group by having the anterior margin of clypeus roundly incised, lateral corners short and broad; anal cell of forewing usually with short and erect cross-vein; serrulae of lancet usually protruding. The *M. sibirica* group differs from the latter group and from others in having additionally: posterior corner of metepimeron sub-quadrate, without appendages; abdominal tergum 1 usually with white maculae. The *M. sibirica* group is represented in China by fifteen previously described species and one new species described here. The collection site of the new species in northern China at Mt. Jiulongchuan in Liaoning Province, is shown in Fig. 1. They can be separated using the following key.

Figure 1. Type locality of *Macrophya nigrotrochanterata* sp. nov. at Mt. Jiulongchuan in Haicheng, Liaoning Province, China.

Key to adults of the *Macrophya sibirica* group from China

1. Forewing with distinct smoky maculae (Figs 2, 3) 2
1′. Forewing hyaline, clearly without any smoky maculae (Figs 4, 5) 3
2. Smoky macula in forewing extending from stigma to vein M and apically to wing tip (Fig. 2); hind trochanter entirely white; hind tibia with distinct white ring at midlength, 0.5× length of hind tibia; posterior 3/5 of abdominal tergum 1 white, basal 2/5 of abdominal tergum 1 black; anterior margin of clypeus shallowly emarginate, lateral lobes short and broad; middle serrulae of lancet with 9 to 11 denticles, subbasal tooth small, setae on annuli long and dense. China (Henan) ..... *M. typhanoptera* Wei & Nie, 1999
2′. Smoky macula in forewing approximately round, extending from stigma to distal margin of wing but not reaching wing tip (Fig. 3); hind trochanter and tibia entirely black; abdominal tergum 1 with narrow white band posteriorly; anterior margin of clypeus deeply circularly incised, lateral lobes narrow and long; middle serrulae of lancet with 5 to 6 denticles, subbasal tooth large, setae on annuli short and sparse. China (Beijing, Hebei, Henan, Shanxi, Tianjin) ..... *M. maculipennis* Wei & Li, 2009
3. Hind tibia entirely black 4
3′. Hind tibia partly black, with brown or white maculae dorsally 6
4. Head and thorax densely and coarsely punctured, without distinct microsculpture; hind tibia and metabasitarsus distinctly broadened; vein C and pterostigma yellowish-brown; middle serrulae of lancet with 17 to 21 denticles, subbasal tooth minute. China (Henan, Hunan, Shanxi) ..... *M. crassitarsalina* Wei & Chen, 2002
4′. Head and thorax distinctly and densely punctured, not rugose; hind tibia and metabasitarsus slender, not broadened; vein C and pterostigma blackish-brown; middle serrulae of lancet with 7 to 10 denticles, subbasal tooth small 5
5. Posterior margin of pronotum with distinct, narrow white band; hind trochanter mostly white, ventral surface with weak black macula; ovipositor sheath approximately 0.9× length of metabasitarsus; anal cell with middle petiole in forewing 1.35× length of vein 1r-m, 0.75× length of vein cu-a; serrulae of lancet straight, middle serrulae with 7



Figures 2–11. (2) *Macrophya typhanoptera* forewing of female, dorsal view; (3) *M. maculipennis* forewing of female, dorsal view; (4) *M. sibirica*, forewing of female, dorsal view; (5) *M. carbonaria* forewing of female, dorsal view; (6)*M. convexina* head of female, dorsal view; (7) *M. tripidona* head of female, dorsal view; (8) *M. stigmaticalis* antenna of female, lateral view; (9) *M. maculoepimera* antenna of female, lateral view; (10) *M. convexina* pronotum of female, dorsal view; (11) *M. tripidona* pronotum of female, dorsal view.

to 10 denticles, setae on annuli long and dense. China (Yunnan).....*M. nigrotibia* Wei & Huang, 2013

5′. Pronotum entirely black; hind trochanter entirely black; ovipositor sheath approximately 1.2× length of metabasitarsus; anal cell without petiole in forewing, with short and erect cross-vein; serrulae of lancet protruding, middle serrulae with 6 to 8 denticles, setae on annuli short and sparse. China (Liaoning) .....*M. nigrotrochanterata* sp. nov.

6. Hind tarsomeres entirely black..... 7

6′. Hind tarsomeres with distinct white maculae..... 13

7. Mesoscutellum with distinct white maculae..... 8

7′. Mesoscutellum entirely black..... 9

8. Pronotum, tergum 1 and hind femur entirely black; hind tibia with white macula at midlength, slightly shorter than 0.5× length of hind tibia. China (Hebei, Heilongjiang, Jilin, Liaoning, Tianjin); Russia (Siberia); North Korea..... .....*M. sibirica* Forsius, 1918

8′. Posterior margin of pronotum with distinct white bands; posterior of tergum 1 with 2 small transverse maculae; dorsal surface of hind femur with distinct white macula apically; hind tibia with white macula at midlength 0.5× length of hind tibia. China (Heilongjiang) ....*M. harbina* Li, Liu & Wei, 2016

9. Labrum and clypeus entirely black..... 10

9′. Labrum and clypeus at least partly white, or labrum and clypeus entirely white 11

10. Body length 8 to 9 mm; outer surface of hind coxa entirely black; anterior margin of clypeus not deeply incised, approximately incised to 1/4 length of clypeus. China (Liaoning, Gansu); Vladivostok....*M. potanini* Jakovlev, 1891

10′. Body length 7.5 mm; outer surface of hind coxa with distinct white oval macula; anterior margin of clypeus deeply incised to approximately 1/2 length of clypeus. China (Gansu) ..... *M. soror* Jakovlev, 1891

11. Posterior margin of abdominal tergum 1 medially with weak white maculae; all trochanters entirely black. China (Liaoning, Zhejiang); Japan.....*M. carbonaria* Smith, 1874

11′. Posterior margin of abdominal tergum 1 medially with a pair of small white maculae; fore and middle trochanters entirely black, hind trochanter white..... 12

12. Hind trochanter mostly black; pronotum entirely black; hind femur 2.5× longer than white macula on outer surface of hind coxa. [Male: labrum and clypeus black except anterior margin of labrum white and base of clypeus with two small white maculae; outer surface of hind coxa with an oval white macula]. China (Anhui, Gansu, Henan, Hubei, Shaanxi, Shanxi, Zhejiang) .....*M. revertana* Wei, 1998

12′. Hind trochanter mostly white; posterior margin of pronotum with distinct white band; hind femur at most 2× longer than white macula on the outer surface of hind coxa. [Male: labrum entirely and clypeus mostly white, base of clypeus black; pronotum entirely black; outer surface of hind coxa entirely black]. China (Gansu, Henan, Ningxia, Qinghai, Shaanxi, Sichuan)..... *M. shii* Wei, 2004

13. Oval white macula on outer surface of hind coxa not extending along its entire length; mesopleuron densely punctured and rugose, spaces between the punctures narrow..... 14

13′. Oval white macula on outer surface of hind coxa extending along entire length of coxa; mesopleuron minutely and sparsely punctured, spaces between the punctures distinct..... 15

14. Labrum and clypeus partly black (Fig. 6); mesoscutellum slightly elevated, but without transverse carina; posterior margin of pronotum with narrow white band (Fig. 10); posterior margin of abdominal tergum 1 medially with two small transverse white maculae, remaining terga entirely black; fore and middle trochanters mostly black; white macula on dorsal surface of hind tibia as long as 0.5× tibia length. China (Hunan, Shaanxi, Zhejiang) ....*M. convexina* Wei & Li, 2013

14′. Labrum and clypeus entirely white (Fig. 7); mesoscutellum with distinct transverse carina; posterior margin of pronotum with distinct and wide white band (Fig. 11); apical 2/3 of abdominal tergum 1 with white maculae narrowing laterally, lateral corners of abdominal terga 2 to 7 with distinct white maculae, posterior margins of all sterna white; fore and middle trochanters entirely white; broad ring at midlength of hind tibia as long as 0.5× tibia length. China (Gansu, Henan, Hubei)..... ..... *M. tripidona* Wei & Chen, 2002

15. Clypeus entirely, hind tibia and hind tarsi mostly yellowish-white; base of antennal flagellum very slender and sub-apical flagellomeres distinctly widened (Fig. 8); postocellar area 2× broader than long, posterior margin very weakly carinate; outer surface of hind coxa black, without white macula; vein C and pterostigma yellowish-brown; serrulae feebly protruding, middle serrulae with 6 to 9 denticles. China (Guizhou, Henan, Hubei, Shaanxi) ....*M. stigmaticalis* Wei & Chen, 2002

15′. Clypeus, hind tibia and hind tarsi mostly black; antennae stout, sub-apical flagellomeres only slightly widened (Fig. 9); postocellar area 2.5× broader than long, posterior margin sharply carinate; outer surface of hind coxa entirely white; serrulae distinctly protruding, middle serrulae with 5 to 6 denticles. China (Hebei, Shaanxi, Shanxi) ....*M. maculoepimera* Wei & Li, 2013

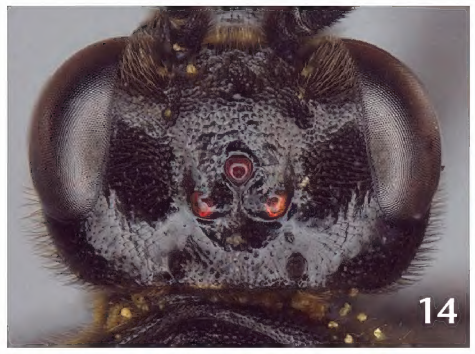
Macrophya nigrotrochanterata sp. nov.

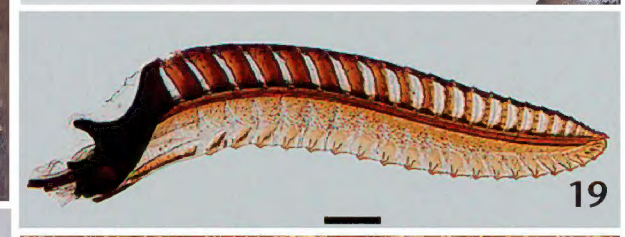
Figs 12–26

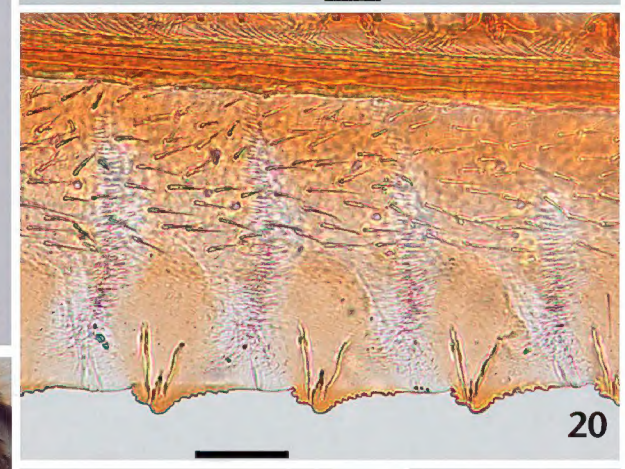
http://zoobank.org/E5662EC0-BD6B-48D3-A902-54F304FA92FB

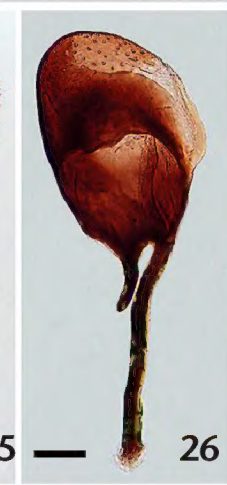
Type locality: China: Liaoning.

Diagnosis. In the *Macrophya sibirica* group, this new species is morphologically similar to *M. nigrotibia*, from Yunnan Province, in having the pronotum entirely black; hind trochanter entirely black; ovipositor sheath approximately 1.2× length of metabasitarsus; anal cell without petiole in forewing, with short and erect cross-vein; serrulae of lancet protruding, middle serrulae with 6 to 8 denticles, setae on annuli short and sparse. *Macrophya nigrotibia* differs in having the following combination of characters: posterior margin of pronotum with distinct, narrow white band; hind trochanter mostly white, ventral surface with weak black macula; ovipositor sheath approximately









Figures 12–26. *Macrophya nigrotrochanterata* sp. nov., female, holotype: (12) female adult, dorsal view; (13) male adult, dorsal view; (14) head of female, dorsal view; (15) head of female, anterior view; (16) antenna of female, lateral view; (17) mesopleuron and metapleuron of female; (18) ovipositor sheath, lateral view; (19) lancet; (20) 8th–10th serrulae; (21) head of male, dorsal view; (22) head of male, anterior view; (23) antenna of male, lateral view; (24) mesopleuron and metapleuron of male; (25) gonoforceps; (26) penis valve. Scale bars: 12, 13 = 2 mm, 19, 25 = 200 µm, 26 = 100 µm, 20 = 50 µm.

0.9× length of metabasitarsus; anal cell with middle petiole in forewing 1.35× length of vein 1r-m, 0.75× length of vein cu-a; serrulae of lancet straight, middle serrulae with 7 to 10 denticles, setae on annuli long and dense.

Description. Body length 10.5 mm (female holotype). Body black; palp mostly brown; a small triangular macula on anterior 1/3 of labrum pale brown; apical half of mandible, small weak macula on lateral corner of clypeus, two small maculae on posteromedial part of mesoscutellum, oval macula on outer surface of hind coxa, apical 1/3 on anterior surface of fore femur and stripe on anterior surface of fore tibia, white. Body hairs silver, setae on sheath blackish-brown. Wings hyaline, without smoky macula, pterostigma and veins largely blackish-brown (Fig. 12).

Vertex surface of head less shiny; frons sparsely and shallowly punctured, interspaces smooth and distinct; inner surfaces of vertex with small smooth areas, without microsculpture; postocellar area with some large and shallow punctures (Fig. 14); labrum and clypeus less shiny, with some large and shallow punctures, surface weakly coriaceous (Fig. 15). Mesonotum dull, punctures on mesonotum smaller and denser than punctures on head, interspaces with fine microsculpture; dorsum of mesoscutellum shiny, with some shallow punctures; mesoscutellar appendage and metascutellum dull, somewhat rugose and with large punctures, microsculpture distinct. Mesepisternum less shiny, densely and coarsely punctured, interspaces narrow; anepimeron dull, densely rugose; anterior margin of katepimeron smooth and shiny, without punctures or microsculpture, otherwise with some large punctures; metepisternum dull, minutely and densely punctured; metepimeron with shallow, large punctures, microsculpture fine (Fig. 17). Abdominal tergum 1 shiny, shallowly punctured laterally, medially almost without punctures; remaining terga dull, surfaces with some small, shallow punctures, microsculpture weak. Surface of sheath coriaceous, with indistinct punctures and fine microsculpture. Hind coxa and outer surface of hind femur shallowly punctured, microsculpture fine.

Labrum weakly elevated medially, approximately 1.5x broader than long, anterior margin shallowly incised; clypeus weakly elevated, width subequal to distance between lower corners of eyes, lateral sides distinctly convergent forwards, anterior margin incised to 1/3 length of clypeus, lateral lobes subtriangular, apical margin subangular (Fig. 15); malar space 0.5× breadth of diameter of middle ocellus; frons elevated, slightly higher than top of eyes in lateral view; middle fovea shallow but distinct; lateral foveae deep, furrow-like; interocellar furrow distinct, postocellar furrow distinct; POL: OOL: OOCL = 12: 21: 16; postocellar area elevated, 2× broader than long, anterior half of lateral furrows obscure, posterior half of lateral furrows deep and broad, divergent backwards; head narrowed behind eyes in dorsal view, occipital carina complete (Fig. 14). Antenna slender, slightly shorter than head and thorax together (50: 54), clearly shorter than abdomen (50: 60); antennomere 2 approximately 1.2× longer than broad; antennomere 3 approximately 1.4× longer than antennomere 4 (7: 5), approximately 0.75× length of antennomeres 4 and 5 together (7: 9.4), antennomeres 6-9 weakly compressed, the ratio of antennomeres 6-9 as 11: 10: 9: 11 (Fig. 16). Mesoscutellum roundly elevated, without carina, as high as top of mesonotum in lateral view; mesoscutellar appendage and metascutellum with short median carina; posterodorsal platform area of mesepimeron as broad as diameter of lateral ocellus (Fig. 17); posterior corner of metepimeron subquadrate, without appendage; mesopleuron and metapleuron as shown in Fig. 17; distance between cenchri 3× breadth of a cenchrus. Hind inner tibial spur 0.6× length of metabasitarsus (12: 22); metabasitarsus slender, 1.1× longer than following 4 tarsomeres together (22: 20); claw with inner tooth shorter than outer tooth. Ovipositor sheath slightly longer than fore femur (22: 20), valvula 3 slightly longer than valvifer 2, posterior margin rounded-subquadrate in lateral view (Fig. 18). Forewing with vein cu-a joining cell 1M at basal 1/3, vein 2r joining cell 2Rs at apical 2/5, cell 2Rs slightly longer than cell 1Rs; anal cell in forewing with short and straight cross-vein; petiole of anal cell in hind wing 1/3× length of vein cu-a (Fig. 12). Lancet with 21 serrulae (Fig. 19), serrulae distinctly protruding and slightly oblique, middle serrulae each with 6 to 8 denticles, subbasal teeth small, setae on annuli short and sparse; the 8th to 10th serrulae as shown in Fig. 20.

Male. Body length 10-10.5 mm (Fig. 13). Body color and structure similar to female; following parts white: small macula at lateral corner of clypeus, anterior surfaces of fore femur, tibia and tarsus, small apical macula on anterior surface of middle femur, small apical macula on dorsal surface of middle tibia. Anterior half of lateral furrow distinct but shallow, posterior half deep and broad, head in dorsal view as shown in Fig. 21; head in anterior view as shown in Fig. 22; ratio of antennomeres 6-9 as 18: 19: 19: 19, antennae in lateral view as shown in Fig. 23; mesopleuron and metapleuron as shown in Fig. 24; subgenital plate longer than broad, apical margin approximately round, gonoforceps as shown in Fig. 25; penis valve as shown in Fig. 26.

Type material. Female holotype, China, Liaoning Province, Haicheng City, Sanjiabu Town, Mt. Jiulongchuan, 40.628°N, 123.099°E, alt. 620 m, 6-9-VI-2016, Zejian LI leg., ethylacetate (LSAF16159). Paratypes, 10 females, same data as the holotype.

Distribution. China (Liaoning).

Variation. Six male specimens with clypeus entirely black; one male specimen with hind tibia with a small white macula.

Host plants. Unknown.

Etymology. The specific name *nigrotrochanterata* is derived from two Latin words "*nigro*" and "*trochanter*", in reference to the entirely black trochanters in both sexes.

DISCUSSION

The *M. sibirica* groupis the third largest of the defined species groups of *Macrophya*. At present, fifteen species belonging to this group were recorded from China by Li et al. (2018), plus the

new species described in this work: *M. carbonaria*, *M. convexina*, *M. crassitarsalina*, *M. harbina*, *M. maculipennis*, *M. maculoepimera*, *M. nigrotibia*, *M. nigrotrochanterata* sp. nov., *M. potanini*, *M. revertana*, *M. shii*, *M. sibirica*, *M. soror*, *M. stigmaticalis*, *M. tripidona*, and *M. typhanoptera*. In Europe, there are six recorded species from this group: *M. albicincta* (Schrank, 1776), *M. alboannulata* A. Costa, 1859, *M. carinthiaca* (Klug, 1817), *M. convexiscutellaris* Muche, 1969, *M. parvula* Konow, 1884, and *M. ribis* (Schrank, 1781). In Japan, there are two recorded species from this group: *M. carbonaria* and *M. timida* Smith, 1874. *Macrophya sibirica* is distributed in Korea and Siberia, *M. parvula* in Syria, *M. potanini* in Vladivostok, and *M. carbonaria* in the Russian Sakhalin island. Among the species of the group, a host plant is known only for *M. carbonaria* Smith, 1874, which is associated to *Sambucus williamsii* Hance (Adoxaceae) (Li et al. 2018). Our key to species and distribution map of the *M. sibirica* group (Fig. 27) should facilitate the recognition and identification of the Chinese species.

ACKNOWLEDGEMENTS

The authors are deeply grateful to Spencer K. Monckton and Marko Prous for valuable comments and suggestions. This research was supported by the Zhejiang Provincial Natural Science Foundation of China (grant# LY18C040001).

LITERATURE CITED

Benson RB (1954) Some sawflies of the European Alps and the Mediterranean region (Hymenoptera: Symphyta). Bulletin of the British Museum (Natural History), Entomology 3(7): 267–295. https://doi.org/10.5962/bhl.part.1054

Costa A (1859) Fauna del Regno di Napoli. Imenotteri. Parte III. – Trivellanti Sessiliventri. [Tentredinidei]. – Antonio Cons, Napoli [1859-1860], 1–116, 1–5.

Dahlbom G (1835) Conspectus Tenthredinidum, Siricidum et Oryssinorum Scandinaviae, quas Hymenopterorum familias. Kongl. Swenska Wetenskaps Academiens Handlingar, Stockholm: 1–16.

Forsius R (1918) Über einige paläarktische Tenthredinini. Meddelanden af Societas pro Fauna et Flora Fennica 44[1917–1918]: 141–153.

Jakovlev A (1891) Diagnoses Tenthredinidarum novarum ex Rossia Europaea, Sibiria, Asia Media et confinum. Trudy

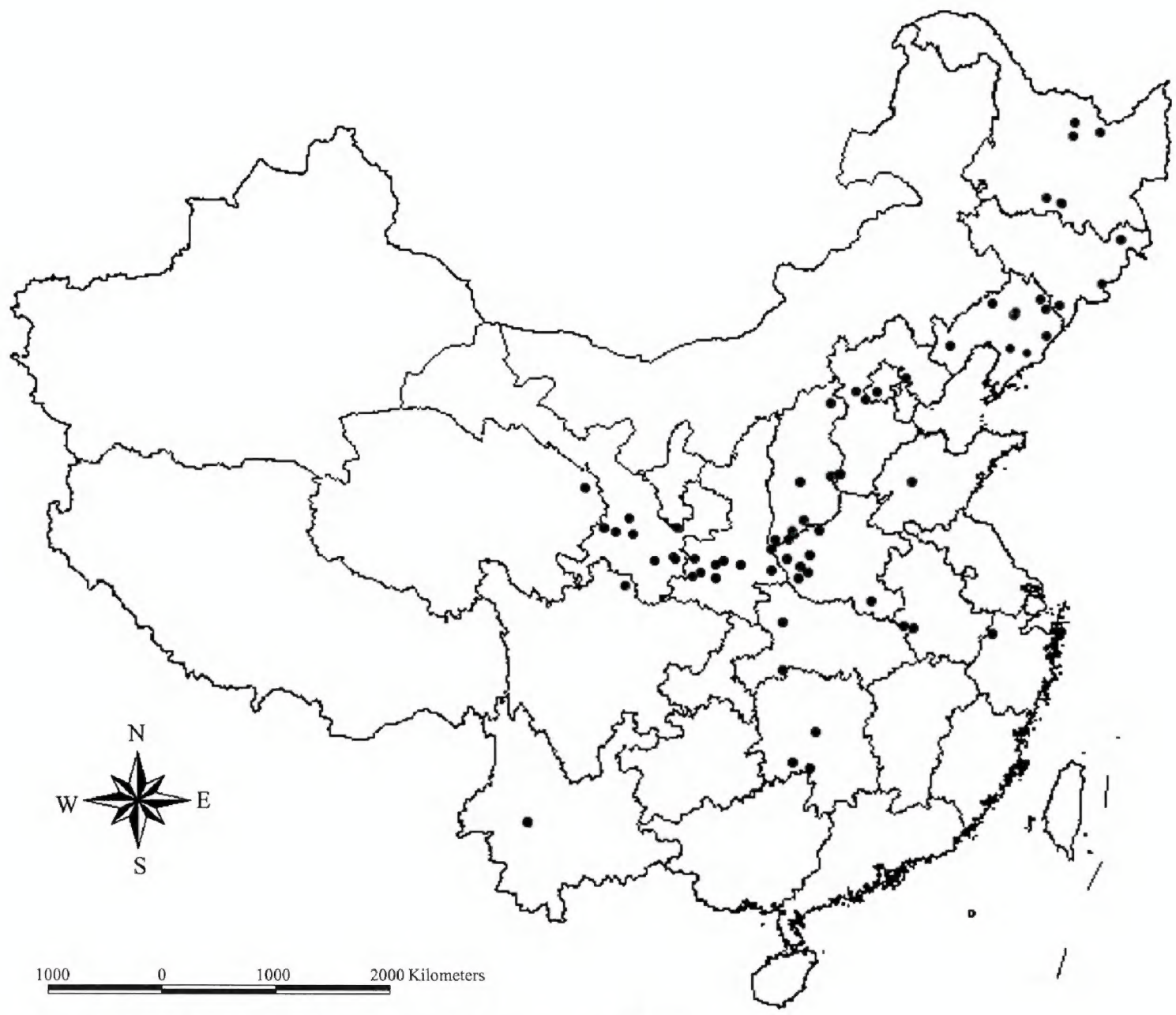


Figure 27. Geographical distribution of the *Macrophya sibirica* group in China.

Russkago Entomologitscheskago Obschtschestva v S. Peterburge 26[1892]: 1–62.

Klug F (1817) Die Blattwespen nach ihren Gattungen und Arten zusammengestellt. Der Gesellschaft Naturforschender Freunde zu Berlin Magazin für die neuesten Entdeckungen in der gesamten Naturkunde 8 (1814) (2): 110–144.

Konow FW (1884) Bemerkungen über Blattwespen. Deutsche Entomologische Zeitschrift 28(2): 305–354.

Li ZJ, Huang NT, Wei MC (2013) Three new species of *Macrophya sibirica* group (Hymenoptera: Tenthredinidae) from China. Acta Zootaxonomica Sinica 38(4): 869–877.

Li ZJ, Liu MM, Wei MC (2016) A new species of *Macrophya* Dahlbom (Hymenoptera: Tenthredinidae) with a key to species of the *Macrophya sibirica* group from China. Entomotaxonomia 38(1): 44–52.

Li ZJ, Wei MC, Liu MM, Chen ML (2018) *Macrophya* Dahlbom in China. China Agricultural Science and Technology Press, Beijing, 456 pp.

Li ZJ, Liu MM, Wei MC (2019a) A new species of *Macrophya* Dahlbom (Hymenoptera: Tenthredinidae) with a key to species of the *Macrophya coxalis* group from China. Entomological Research 49(2): 105–109. https://doi.org/10.1111/1748-5967.12335

Li ZJ, Liu MM, Wei MC (2019b) Three new species of *Macrophya maculitibia* group (Hymenoptera: Tenthredinidae) with a key to known species from China. Zoosystematics and Evolution 95(3): 37–48. https://doi.org/10.3897/zse.95.28804

Liu MM, Hong Z, Zhong YH, Li ZJ, Wei MC (2019a) Two new species of *Macrophya flavomaculata* group (Hymenoptera, Tenthredinidae) from China. Entomotaxonomia 41(1): 8–18.

Liu MM, Li ZJ, Wei MC (2019b) Review of the *Macrophya formosana* group (Hymenoptera: Tenthredinidae) from China with descriptions of two new species. Entomological Research 49(5): 203–213. https://doi.org/10.1111/1748-5967.12347

Liu MM, Li ZJ, Wei MC (2019c) Three new species of *Macrophya* Dahlbom (Hymenoptera, Tenthredinidae) with a key to species of the *Macrophya imitator* group in China. Zoosystematics and Evolution 95(2): 417–427. https://doi.org/10.3897/zse.95.35594

Liu MM, Li ZJ, Wei MC (2020a) Three new species of the *Macrophya histrio* group (Hymenoptera: Tenthredinidae) with a key to species from China. Entomotaxonomia 42(1): 57–69.

Liu MM, Li ZJ, Wei MC (2020b) Key to the *Macrophya zhaoae* group (Hymenoptera, Tenthredinidae) with description of a new species from China. Alpine Entomology 4(6): 65–72. https://doi.org/10.3897/alpento.4.48232

Muche WH (1969) 3. Beitrag zur Kenntnis der Symphyten des Kaukasus (Hymenoptera). Faunistische Abhandlungen Staatliches Museum für Tierkunde Dresden 2(22): 153–171.

Ross HH (1945) Sawfly genitalia: terminology and study techniques. Entomological News 61(10): 261–268.

Schrank F von P (1776) Beyträge zur Naturgeschichte. Mit sieben von dem Verfasser selbst gezeichneten, und in Kupfer gestochenen Tabellen. Gebr. Veith, Augsburg, [6]+137+[3] pp.

Schrank F von P (1781) Enumeratio Insectorum Austriae indigenorum. E. Klett et Franck, Augustae Vindelicorum, [22]+1-548+[2] pp.

Smith F (1874) Descriptions of new species of Tenthredinidae, Ichneumonidae, Chrysididae, Formicidae & c. of Japan. Transactions of the Entomological Society of London 1874(3): 373–409.

Takeuchi K (1952) A Generic Classification of the Japanese Tenthredinidae (Hymenoptera: Symphyta). Kyoto, 90 pp.

Viitasaari M (2002) The Suborder Symphyta of the Hymenoptera. In: Viitasaari M (Ed.) Sawflies (Hymenoptera, Symphyta) I. A Review of the Suborder, the Western Palaearctic Taxa of Xyeloidea and Pamphilioidea. Tremex, Helsinki, pp. 11–174.

Wei MC, Chen ML (2002) Five new species of *Macrophya* Dahlbom from Mt. Funiu, Henna [sic!], China (Hymenoptera: Tenthredinidae). In: Shen XC, Zhao YQ (Eds) Insects of the Mountains Taihang and Tongbai Regions. China Agricultural Science and Technology Press, Beijing, 200–207.

Wei MC, Li ZJ (2009) A new species of *Macrophya* Dahlbom (Hymenoptera, Tenthredinidae) from China. Acta Zootaxonomica Sinica 34(1): 55–57.

Wei MC, Nie HY (1998) New species of *Macrophya* from Funiushan (Hymenoptera: Tenthredinidae). In: Shen XC, Shi ZY (Eds) Insects of the Funiu Mountains Region (1). China Agricultural Science and Technology Press, Beijing, 152–161.

Wei MC, Nie HY (1999) New species of sawflies collected by Mr. Sheng and Ms. Sun from Henan Province (Hymenoptera: Tenthredinomorpha). In: Shen XC, Pei HC (Eds) Insects of the Mountains Funiu and Dabie regions. China Agricultural Science and Technology Press, Beijing, 152–166.

Wei MC, Shi FM (2004) Two New Sawfly Species (Hymenoptera: Tenthredinidae) from Jiuzhaigou and Southern Gansu of China. Entomotaxonomia 26(4): 293–298.

Submitted: February 16, 2020
Accepted: October 7, 2020
Available online: December 3, 2020
Editorial responsibility: Gabriel L.F. Mejdalani

Author Contributions: ML, ZL and MW contributed equally to this article.
Competing Interests: The authors have declared that no competing interests exist.
© 2020 Sociedade Brasileira de Zoologia. Published by Pensoft Publishers at https://zoologia.pensoft.net